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SCIENCE NEWS LETTER

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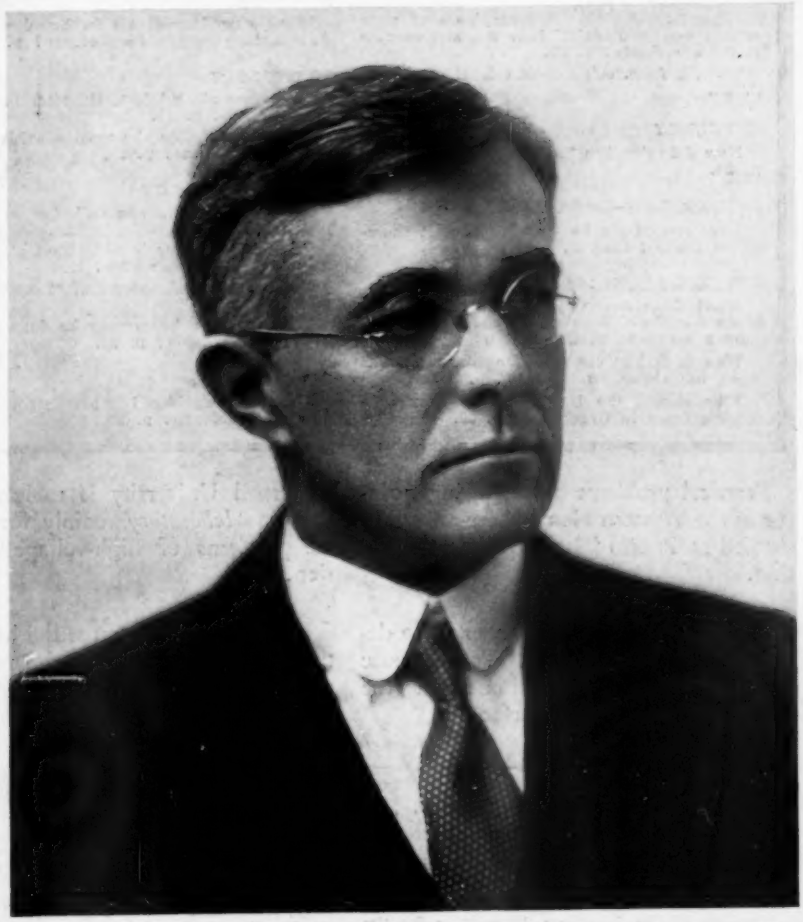
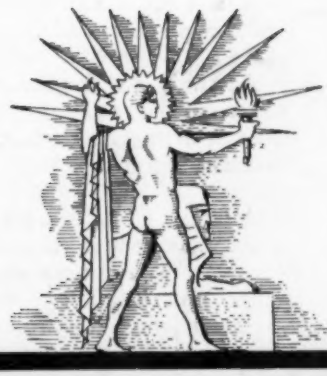
THE WEEKLY SUMMARY OF CURRENT SCIENCE •





January 11, 1941

New President, A.A.A.S.

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A SCIENCE SERVICE PUBLICATION

Do You Know?

A new tile-like hollow block is made of *plastic*.

Frozen hams cure more rapidly than unfrozen ones.

When hatched, *a baby ostrich* is no bigger than a chicken.

Shells of *cashew nuts* contain oil that has industrial possibilities.

There are more than 100 kinds of *small mammals* in the northeastern United States.

Man's earliest *mining* work was done in the Stone Age, to obtain flint for making implements.

The American woodcock lives mainly on an *earthworm* diet, and seems to have no substitute foods.

Only four groves are left of the Phoenicians' famous and extensive forests of *cedars of Lebanon*.

A new British *oil refinery* underground will turn out about 30,000 barrels of petroleum products daily.

An airplane with *glass wings* is a new experiment—the wings being covered with woven glass fabric, highly fire-resistant and strong.

A female *Black Widow* spider, says a government naturalist, eats her mate just because she is hungry and cannot find other food.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.*

ARCHAEOLOGY

How did scientists succeed in taking a mummy apart and keeping its exterior as it was? p. 25.

ASTRONOMY

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BACTERIOLOGY

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BIOLOGY

What element does an oyster need to make it a mother? p. 24.

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CHEMISTRY

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ENTOMOLOGY—BOTANY

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GENERAL SCIENCE

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LANGUAGE

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PHYSIOLOGY

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What is probably the most sensitive of all biological systems? p. 20.

PLANT PHYSIOLOGY

How can "birth control" for apples be practiced? p. 24.

What is necessary in order that plant roots may take up nutrients? p. 19.

What is the advantage of "aeroculture"? p. 20.

What possible harm may be done to trees by 17-year cicadas? p. 20.

PSYCHOLOGY

What is considered most important for America's defense? p. 22.

Practical problems of producing *quinine* in the Western Hemisphere are being studied at Puerto Rico's agricultural station.

A 10,000-watt *mercury vapor lamp* developed experimentally at Westinghouse Lamp Laboratories has one-fifth the brightness of the sun's surface.

Cornell University is to have a new $150,000 *laboratory* mainly for research on problems of high-voltage transmission.

A *sneeze* may be caused either by irritation of nerve-endings in the nose lining, or by stimulating the optic nerve by a bright light.

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PLANT PHYSIOLOGY

$1,000 A.A.A.S. Prize Given For Plant Research

Drs. D. R. Hoagland and D. I. Arnon Honored For Showing Plant Roots Actively Seek Nutrients

DEMONSTRATION that plant roots actively go after needed mineral elements in the soil, actually working for what they get rather than just letting these nutrients drift into them, figured decisively in the winning of the annual $1,000 prize of the American Association for the Advancement of Science by a paper read at the meetings by Dr. D. I. Arnon of the University of California. Dr. Arnon spoke on behalf of a seven-man laboratory team headed by Prof. D. R. Hoagland.

The classic theory of plants' absorption of mineral elements, still presented in all botany textbooks, holds that plant roots are quite passive, and that the mineral ions merely diffuse into them, very much as a drop of ink in a tumblerful of water slowly spreads to color the whole of it. This was shown to be in error by the researches of Prof. Hoagland and his associates, which proved that only roots which are actively expending energy can absorb the nutrient elements.

The researches were conducted on roots which had been cut away from the parent plants—usually barley. It was found that only roots giving off carbon dioxide—sure sign of active metabolism, or life processes—could absorb mineral salts. A high rate of growth or a high respiration rate always accompany rapid absorption. Cells that are not actively alive are poor absorbers of minerals.

In addition to its interest as "pure" science, this new concept of mineral absorption by plants has considerable potential practical importance, for its helps in getting a better understanding of such basic agricultural practises as irrigation and the use of fertilizers.

Also discussed in the prize paper were other phases of the work done at the Berkeley laboratory, particularly on the disposal of mineral elements by the plant after it has absorbed them through its roots. Especial attention was given to some of the so-called micro-nutrients like manganese, zinc and boron, which are needed by plants in concentrations of only a few parts per million of water absorbed.

The research team working with Prof. Hoagland comprises, in addition to Dr. Arnon: T. C. Boyer, Dr. F. C. Steward, Dr. P. R. Stout, Dr. H. Jenny and Dr. R. Overstreet. One of the men, Dr. Steward, is at present conducting his work under severe handicaps—he is at the University of London, which is for the moment not in London but "somewhere in England."

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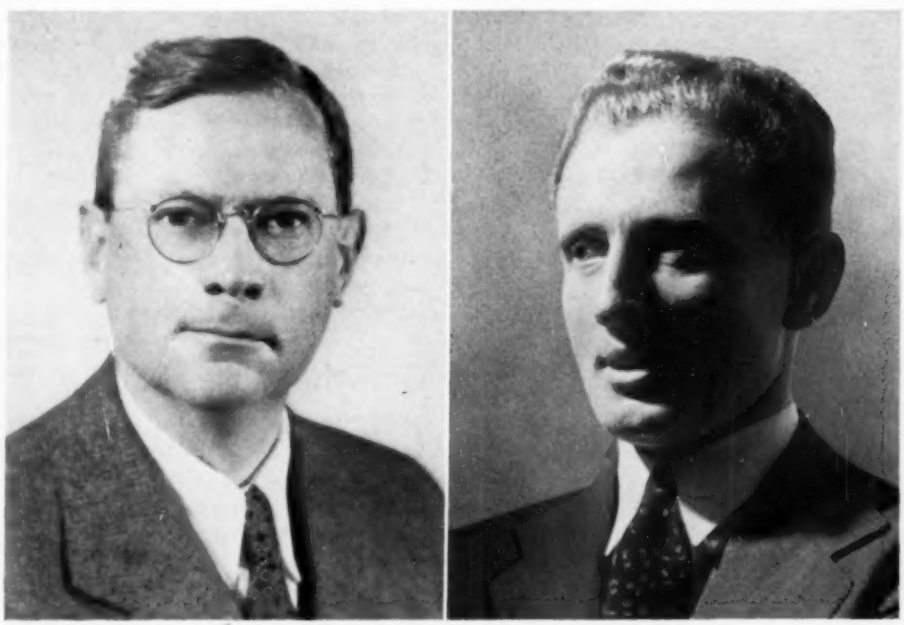

HONORED

Prof. D. R. Hoagland (left) and Dr. D. I. Arnon, both of the University of California, were awarded the annual $1,000 prize of the American Association for the Advancement of Science for research that upsets the classic theory of plants' absorption of minerals.

Chemists count at least 14 major types of *synthetic plastics* now used in human apparel.

PHYSIOLOGY

Vitamin A Blood Content Increases After Alcohol

TAKING alcohol raises the vitamin A content of the blood in men as well as dogs, Dr. Samuel W. Clausen, Dr. Burtis B. Breese, Dr. William S. Baum, Dr. Augusta B. McCoord and Dr. John O. Rydeen, of the University of Rochester School of Medicine and Dentistry, announced (*Science*, Jan. 3).

Before-and-after tests were made on 10 persons taking alcohol in the form of mixed drinks as desired during the course of "the usual social evening drinking common in this country." In every case the amount of vitamin A in the blood was increased after the drinking. The increase was relatively slight in most cases but was remarkably large in one person who had a high level of vitamin A in his blood before the drinking.

Night blindness is one of the chief signs of lack of this vitamin, although it is required for health of other parts of the body besides the eyes and for normal growth of children.

Tests of ability to see in the dark, one method of determining whether a person is getting enough vitamin A, made after drinking, showed unaccountably short recovery time in dark adaptation. Dr. L. B. Pett, of the University of Alberta, who made this observation, suggested that the reason was the mobilization of vitamin A from its storage place in the body, presumably the liver, to the blood which would distribute it to other parts of the body including the eyes.

The vitamin A tests reported by the Rochester scientists were made on the blood, not the eyes. These scientists also

believe that the increase in blood vitamin A after alcohol is due to a mobilization of the vitamin from other tissues. They suggest that this might form the basis of a test for vitamin A storage in the body.

Science News Letter, January 11, 1941

GEOGRAPHY

Maps Show Changing World As Possible Aid to Peace

WITH the world changing so rapidly, present-day maps are not adequate to show its alterations, S. Whittemore Boggs, geographer of the U. S. Department of State, told the American Association for the Advancement of Science. New maps are needed, which may aid in establishing a peaceful society.

Speaking before the section on geology and geography, he said that "maps should be devised to portray more effectively the great changes that have taken place throughout the world in the last century, largely as a result of improvements in travel, transportation and communication facilities."

He showed examples of several new maps. One he called an "isotachic map," the name coming from a Greek word meaning "equal speed." This, he said, "is analogous to physical maps with shadings between contours, in which the higher elevations are depicted in darker shadings. The territory in which travel within a given range of speed prevails is shown in a single shading, the lighter the shading the greater the speed. A map of 1940, by comparison with one of 1800, represents a change as fundamental as if giant steam shovels and grading machines had leveled the mountains and made the surface of the United States almost as smooth as a billiard table."

Such maps, he said, might prove an aid to thinking in terms of the earth as a whole, which might aid in world peace. They may show, he declared, "that recent inventions and techniques, instead of making a 'shrinking world,' have greatly lengthened the outreach of nations and groups, multiplied impacts, and tended to intensify rivalries which may be manifested anywhere on the globe. Such maps may also stimulate thinking in world terms, which is important at a time when such thinking is partially paralyzed."

Science News Letter, January 11, 1941

To prevent snow glare on Canada's snow-covered aviation landing fields, corrugated pipe equipment is rolled over the snow to form *ripples*.

PHYSIOLOGY

Change in Nine Molecules Produces Sensation of Sight

Each Quantum of Light Able to Cause Necessary Change in Visual Purple; No Physical System Like It

A CHANGE in only eight or nine molecules of the "sight chemical," visual purple, in the retina of the human eye is sufficient to produce the sensation of sight, Prof. Selig Hecht of Columbia University told the American Association for the Advancement of Science at Philadelphia. Associated with Prof. Hecht in his experiments were Simon Shlaer, also of Columbia, and Dr. Maurice H. Pirenne of the Belgian-American Educational Foundation.

In the research, an observer would stay in a dark room for half an hour, until his eyes had become dark-adapted and reached a maximum of sensitivity to light. Then a flash of light, exactly a hundredth of a second in duration and of carefully measured radiant-energy content, was shot at his eyes. The amount of light actually reaching the retina, when the minimum sight-causing illumination was reached, was calculated at eight or nine quanta, each quantum being able to cause the necessary chemical change in one molecule of visual purple in the retina.

Prof. Hecht commented, "Judging by the structure of the retina, the structure of light, and the chemistry of visual purple, it is hard to conceive of a biological system which could be more sensitive than this. Certainly there are no physical systems which even approach it."

Science News Letter, January 11, 1941

Cicadas May Harm Trees

SEVENTEEN-YEAR cicadas, usually called "locusts" when their shrilling swarms appear, may do more harm to trees than is commonly supposed, Dr. Gregory Thoennes of St. Mary's College of Winona, Minn., suggested. Dr. Thoennes has kept track of trees affected by an outbreak of seventeen-year cicadas in Missouri six years ago, and is of the opinion that the consequences of the excessive egg-deposition in the rind of young twigs are being too lightly dismissed by biologists.

The cicada, emerging after seventeen years of subterranean life, sings, mates, lays its eggs and dies. The eggs are shoved into the green bark of young twigs, frequently in such numbers that the twigs wither and fall off.

It has always been supposed that the trees recovered from these infrequent partial defoliations with little injury, but Dr. Thoennes declared that in the case of orchard trees especially, measurements made for the past six years indicate a marked decrease in the yearly growth of injured branches. This change in growth rate, he said, is more noticeable in older trees than in younger ones, and in neglected trees than in those that have been well cultivated. In either case, however, the growth of affected branches is less than that of uninjured ones.

Science News Letter, January 11, 1941

Plants With Roots in Air

"AEROCULTURE," a new method for growing plants with their roots suspended in air, never either touching soil or being kept immersed in water, was described before the plant physiologists attending the meeting by its inventor, Prof. M. A. Raines of Howard University. Water, with mineral nutrients dissolved in it, is supplied by spraying or frequent dipping. A promising feature of the method, said Prof. Raines, is that sugar or other carbohydrates may be supplied without the elaborate precautions necessary to prevent fermentation or bacterial and mold growth when other methods are employed.

Science News Letter, January 11, 1941

Growth-Chemical Spray

COTTON yields were boosted by a third in experimental plots sprayed daily for three weeks during July with a one-to-one-million solution of the growth-promoting chemical, indole acetic acid, Prof. J. C. Ireland of Oklahoma Agricultural and Mechanical College reported before the meeting of the American Society of Plant Physiologists.

"This would suggest that the use of a synthetic hormone causes the cotton plants to develop more bolls to maturity," said Prof. Ireland. "There is an apparent

increased vigor of the plants, probably due to an increased rate of the use of plant foods."

In another experiment, performed on individual plants in the greenhouse, the pistil, or seed-bearing part of the flower, was treated with a paste containing colchicine and indole acetic acid. Unpollinated pistils produced fertile seed, which thus had a mother but no father. Plants are now being grown from those seeds. The cotton fibers from the colchicine-treated flowers were longer and stronger than that from untreated flowers.

Science News Letter, January 11, 1941

GENERAL SCIENCE

Dr. Irving Langmuir Elected New A.A.A.S President

Scientists Honor Man Whose Study of Surfaces Led To Brighter Light Bulbs and Wetter or Drier Water

See Front Cover

WHENEVER you switch on an electric light you are getting the benefit of one of the many researches of Dr. Irving Langmuir, newly elected president of the American Association for the Advancement of Science. For Dr. Langmuir, who won the Nobel Prize in chemistry in 1932, is responsible for the present-day practise of filling light bulbs with gas (usually nitrogen) that prolongs their life, makes them more efficient, and cuts down your monthly light bill.

This, however, is only one of the applications that have been made of a central principle that has dominated the long series of physical investigations which he and his staff have been carrying on in the research laboratories of the General Electric Company at Schenectady, N. Y., during the past thirty years and more. What Dr. Langmuir is really interested in is what happens at surfaces where two substances come together. He was led to the discovery of a way to make better and longer-lived electric lamps by his interest in what went on when molecules of various kinds of gases were in contact with the surface of hot metals. Nothing much goes on when nitrogen or another inert gas touches hot tungsten—and that is why a gas-filled lamp keeps on shining so brightly and so long.

Another of Dr. Langmuir's accomplishments has been the production on a large scale, and the industrial utilization, of what is known as dissociated hydrogen. Ordinary hydrogen, such as every high school chemistry student makes by pouring acid on zinc, consists of two atoms tied together to make one molecule. These two-atom molecules can be split apart into single atoms by squirting hydrogen through an electric arc.

Making dissociated hydrogen was only a kind of scientific stunt until Dr. Langmuir took it in hand. He devised a way to control the jet, and to turn it on metals to be welded. The single molecules of hydrogen, eagerly seeking mates, end their solitary state in a union that produces very high temperatures. These high-temperature jets are particularly good for welding, because there is no oxygen present, as there always is in ordinary flame, to produce troublesome oxides and scale.

Dr. Langmuir has lately been performing some other interesting but as yet apparently useless scientific stunts with ways to make the surface of water and other liquids wetter or drier than they normally are. What use will be made of this is not yet evident—but if past records mean anything, those "stunts" will doubtless bear watching.

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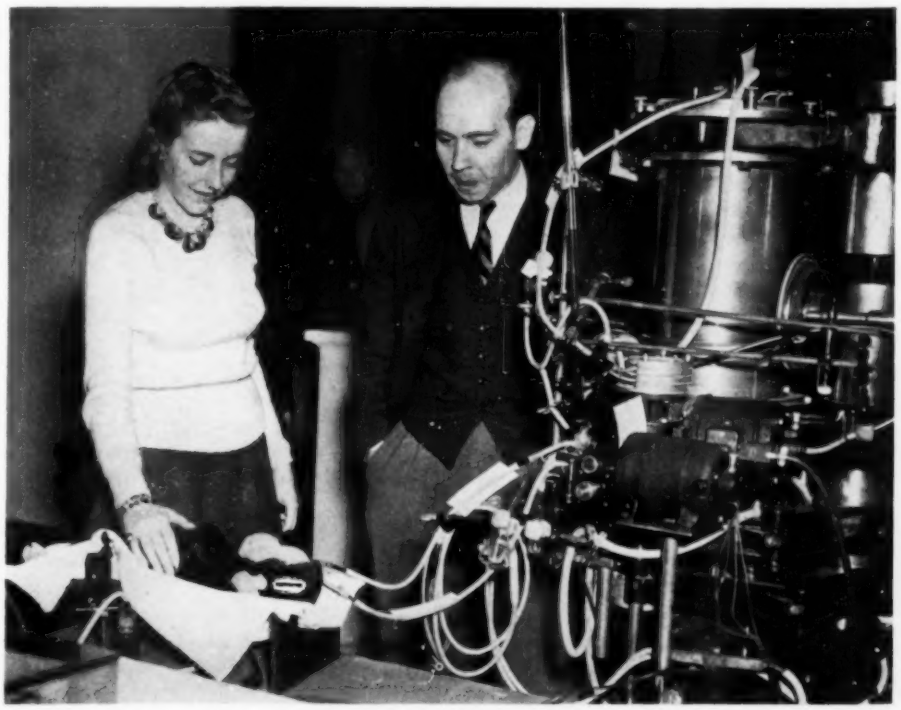
ENTOMOLOGY—BOTANY

Insect Resistant Plants Are Now Being Bred

PLANTS that "bugs" don't like are being bred by American agricultural scientists in a new offensive against the insect menace. While the new kinds of plants become untouchable to devouring insects, they remain tasty and nutritious to man and beast for whom they are raised as food.

Instead of trying to fight the insect foes of our farms only with poison and



ARTIFICIAL LUNG AND HEART DEVICE

The toy monkey that Miss Margery Kitchen is admiring has an artificial heart and lung device attached to him. The apparatus is used to withdraw the blood from an animal's veins and return it to his arteries after treating it much as the lungs would. Charles Kraul demonstrated the apparatus for the Harrison Department of Surgical Research at the meeting of the American Association for the Advancement of Science in Philadelphia. The apparatus was designed by Drs. John H. Gibbon, Mary H. Gibbon and Charles Kraul.

other such methods of control, the idea is to make the plant do its own fighting by being so disagreeable to the attacking insects that they will seek their dinners elsewhere and even starve.

Scientists of the American Association for the Advancement of Science meeting in Philadelphia discussed the latest results of this mode of defense. Intensive research is under way at experiment stations in California, Illinois, Indiana, Missouri, Ohio, Oklahoma, Texas, Wisconsin and Kansas where pioneer research was undertaken.

More than a century ago the first insect-resistant plants were discovered. In a few cases they were used practically on farms. But not until recent years did the entomologists and the plant breeders cooperate to make insect-resisting plants to order.

Alfalfa, corn, onions, sorghum and wheat are among the crops in which insect resistance has been developed. Seeds for a number of these new varieties have already been released or recommended by experiment stations.

But farmers are warned by Prof. Reginald H. Painter of Kansas State Agricultural College that "claims of seedsmen concerning insect resistance of particular plant varieties should be confirmed by a federal or state experiment station before they are counted on too heavily."

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PSYCHOLOGY

Need Intellectual Defense Even More Than Airplanes

Educator Regards as Disloyal Practice of Schools In Leaving to Chance All Instruction in Democracy

AMERICA needs intellectual and emotional defense even more than she needs tanks, destroyers and airplanes, Dr. M. R. Trabue, of Pennsylvania State College, told the American Association for the Advancement of Science in his address as retiring vice-president of the Education Section.

"The doubts and misgivings of our citizens are as dangerous to American democracy today," he declared, "as the submarines, airplanes and bombs of Herr Hitler. There are among us people of great influence who really believe that democracy can never be highly efficient.

"These attitudes of our own citizens are one of the great dangers that American democracy is facing today. It is against these that we who are students of education must organize and plan for the defense of democracy."

Dr. Trabue indicted as disloyal the practice of the public schools to plan specifically for developing knowledge of algebra, French, and physics, while leaving it to the pupil to pick up incidentally the attitudes and skills he needs for the democratic way of life.

Scientific research has taught educators that learning cannot be acquired by mere repetition—the learning must satisfy some real need in the individual. The habits and skills needed by the citizen in a democracy cannot be acquired until the desire to serve some group has become strong enough to balance the individual's natural craving for personal recognition.

Organized athletic and academic contests might build up such a desire, Dr. Trabue indicated, but in the past such activities have been used to develop academic and physical skills instead of for the building of social attitudes and democratic character traits.

Another finding of educational research that Dr. Trabue believes can be put to work in America's emotional defense program is the discovery of the importance of personal experience in learning. A pupil cannot learn how to be a citizen in a democracy by reading about it in a book or by listening to what a teacher says about it.

Pupils must learn how to cooperate in the activities chosen by their group, even though they personally were in favor of doing something else. They must learn also to respect and help the honest efforts of sincere minorities to change the majority opinion. And the democratic situation that they meet in school must not be so artificial and unreal that the pupils are unable to recognize similar situations met with in later life.

The weakness of democracy, Dr. Trabue concluded, has been in its practice rather than in its theory. Educators must not neglect to put their own theories into immediate practice in the defense of democracy.

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BIOLOGY

New Biological Society Formed at Science Meeting

A NEW scientific body, the American Biological Society, was organized during the Philadelphia meetings when a group of leading biologists gathered at the home of Col. A. P. Hitchens of the University of Pennsylvania school of medicine.

Various branches of biology, such as zoology, botany, bacteriology and genetics, have special societies, some of them with large memberships, but until now there has been no general, inclusive body to which all biologists can belong, as chemists of all branches are united in the American Chemical Society.

One of the principal purposes of the new American Biological Society is to support and promote one of the most important of American scientific periodicals, *Biological Abstracts,* which presents condensed summaries of all biological articles and books published anywhere in the world. A major part of each member's dues will be credited to his subscription to *Biological Abstracts.*

Membership will not be limited to professional scientists. According to the terms of the constitution, "Any person interested in the promotion of biology shall be eligible for election as an active member of the Society."

Prof. A. J. Carlson of the University of Chicago was elected first president with Col. Hitchens as secretary.

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INVENTION

View Through "Telescope" Is Really Just Upstairs

AN AMUSEMENT device which has just been patented has a large and impressive telescope, through which the looker seems to be watching a scene at a great distance, but actually, by a small telescope, and an arrangement of mirrors, he is looking at a subject on the next floor, above, through a small unnoticeable hole in the ceiling. (*U. S. Patent 2,222,084, Harry S. Manchester, Inc., Madison, Wisc.*)

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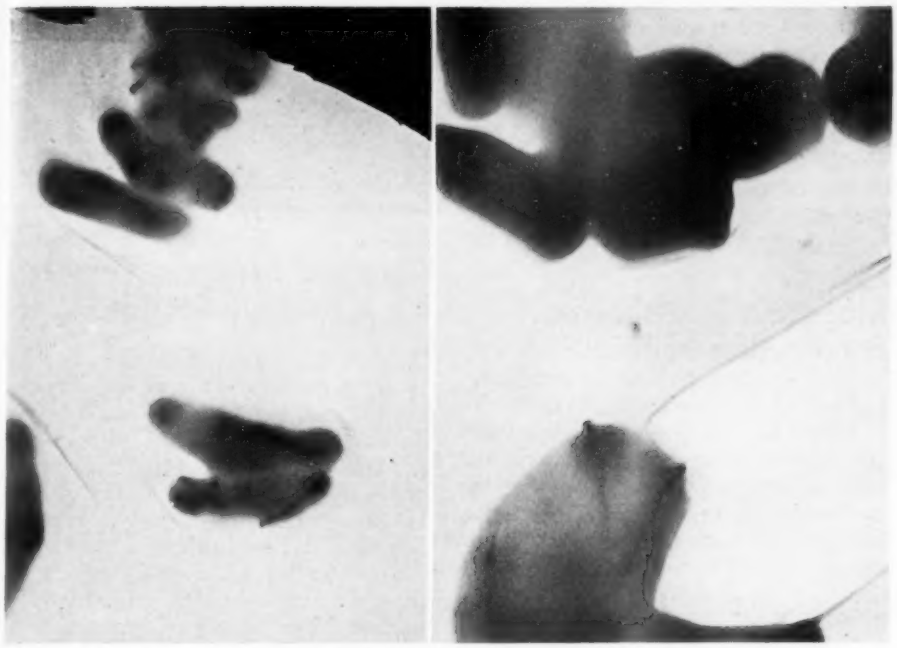
Salting coal piles in winter keeps the coal from caking in troublesome lumps, Canadian railways find.



CHEMISTRY IN GERMS

The electron microscope, by enabling scientists to shoot this 10,000-times-life-size picture of the diphtheria bacillus (left), showed how the tiny germ changes a tellurium salt into metallic tellurium, seen in crystals (the dark rods) at the end of the germ. At 30,000 magnification (right), the tellurium crystals can be seen pushing their way through the germ into the surrounding space.

ASTRONOMY

Stars Change Shape While Revolving Around Companions

Tidal Pull of Each Star Stretches the Other Into Egg Shape as They Swing About in Cosmic Waltz

EGG-SHAPED stars, which sometimes are more stretched out, at other times more nearly spherical, were described by Dr. Theodore E. Sterne, of the Harvard College Observatory, before the meeting of the American Astronomical Society in Philadelphia.

These are stars known as eclipsing binaries. Such a system consists of two separate bodies, revolving around each other in a sort of cosmic waltz. When one comes between us and the other partner, the total light reaching us is reduced. No telescope is powerful enough to show the two separately, but their presence can be deduced from the way the light varies, and from analysis of the light with the spectroscope.

The tidal pull of each star on the other stretches it, so they are never exactly spherical, said Dr. Sterne. As they rotate, they present varying amounts of their surface to observers, depending on whether we see the egg on end or sideways. This causes additional variation of light, in addition to the eclipses.

Until lately, it has been assumed that the stars, though not spherical, remained constant while they performed their dance. This is not the case, said Dr. Sterne, for his calculations, which were made independently by an English mathematical astronomer, show that if, as is often the case, the paths are not perfectly circular, the stars will be stretched most when they are closest. When farthest, they will be more nearly round. This variation in shape must be considered in interpreting the changes of light, he stated.

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BACTERIOLOGY

Probe Secrets of Germs With Electron Microscope

NEW FACTS about the diphtheria bacillus, which that germ has hitherto kept secret from man's prying microscopes, have been discovered by Dr. Harry E. Morton, University of Pennsylvania School of Medicine, and Dr. Thomas F. Anderson, research laboratories of the Radio Corporation of America.

The electron microscope, which uses particles of electricity instead of light and magnetic fields instead of lenses to let scientists see objects one-fiftieth the size of anything heretofore visible, enabled Drs. Morton and Anderson to record the location of chemical reactions within the tiny diphtheria germ.

Crystals of tellurium metal are formed from tellurite salts within the diphtheria bacillus, they discovered in electron microscope studies reported to the Society of American Bacteriologists in St. Louis.

The fact that the diphtheria bacillus and other microorganisms could reduce tellurite salts to black tellurium metal has been known since 1900, but in the case of the diphtheria bacillus, it was explained, it was not known where the formation of the metal occurred.

Crystals of tellurium are not only contained within many of the diphtheria cells, the electron microscope pictures showed, but in some cases the crystals perforate the cells and extend into the surrounding space.

"Occasionally," Dr. Morton said, "when the crystal projects through the cell the outline of the cell extends along the edge of the crystal a short distance suggesting that the cell 'membrane' was perforated from the inside outward. The tellurite crystals disappear upon treatment with appropriate chemicals."

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●RADIO

W. H. Cameron, managing director of the National Safety Council, will tell you "How YOU Can Help Reduce Accidents in 1941" as guest scientist on "Adventures in Science" with Watson Davis, director of Science Service, over the coast to coast network of the Columbia Broadcasting System, Thursday, Jan. 16, 3:45 p.m. EST, 2:45 CST, 1:45 MST, 12:45 PST. Listen in on your local station. Listen in each Thursday.

BIOLOGY

Oysters Need Manganese To Make Them Mothers

MANGANESE, the mother-love metal, is needed by oysters no less than by higher animals if they are to function as mothers, Dr. Paul S. Galtsoff of the U. S. Fish and Wildlife Service reported to the American Society of Zoologists in Philadelphia. He found a marked rise in the amount of manganese present in oysters when their eggs were developing and ripening. This manganese content, moreover, was concentrated principally in their ovaries. Concentration was relatively low in other tissues, as it was also in the reproductive organs of oysters in the male phase of their existence.

This represents an extension of the known connection between manganese and maternity. Some time ago, other zoologists showed, in experiments with rats, that female animals on manganese-deficient diets might produce young but they would not suckle or otherwise take care of them. Apparently the Colonel's Lady (if she is a good mother) and the oysters she eats are physiologically "sisters under the skin."

Science News Letter, January 11, 1941

BACTERIOLOGY

Ultraviolet Light Plays New Detective Role

INVISIBLE ultraviolet light, already used by G-men in running down foreign espionage agents and public enemies, acts as a detective in finding potatoes guilty of spreading one of the worst diseases of that important crop.

Prof. R. B. Harvey of the University of Minnesota told the American Association for the Advancement of Science of his experiences with a method for using this radiation in finding and eliminating carriers of bacterial ring rot.

Appearing only a few years ago, ring rot has already struck in 37 states, in some regions destroying 50% or more of the crop. Plant pathologists, cooperating in many states, discovered that the germ does not live in the soil but comes in with the seed. If the farmer doesn't plant it he won't have it.

In cutting the seed, the farmer spreads ring-rot germs on his knife, from a few diseased tubers to many healthy ones. This much was already known, but scientists did not know how to detect the diseased potatoes quickly and cheaply.

Then it was discovered that if ultraviolet rays are turned on a lot of seed potatoes in the dark, the good ones remain invisible but the diseased tubers glow with a ghostly, greenish light that makes them easy to detect and cull out. The grower gets complete protection if he uses certified seeds that have been so treated.

Science News Letter, January 11, 1941

AGRICULTURE

Mountain Strawberries For Hardier Hybrids

HARDIER strawberries, suitable for growing in parts of the country that cannot now produce strawberries successfully, are the promise of hybridization experiments involving wild strawberry species from the Rocky Mountain region, reported to the American Association for the Advancement of Science by Dr. A. C. Hildreth and Dr. LeRoy Powers. Present cultivated strawberries just can't "take it" from the winters of the northern Great Plains and the western mountain valleys and plateaus, where the cold is often intense, the winds high and dry, and snow cover scanty. The hybrids between wild and tame strawberries reported by Drs. Hildreth and Powers are not ready for general use yet, but they are regarded as giving promise of really good berries after further cross-breedings.

Science News Letter, January 11, 1941

CHEMISTRY

First High-Powered Look At Soap's Twisted Fibers

BY AID of an electron microscope, magnifying reality 113,000 times, scientists have seen with their eyes into the mystery casually referred to as soap.

Soap is revealed as consisting of bundles of fibers, some of them twisted, reports Dr. J. W. McBain, Stanford University professor of chemistry, who becomes the first human being to observe the basic structure of soap.

Possibility that soap may be photographed in even greater minuteness, showing the very atoms that make up the molecules, is foreseen, as the next step toward solving soap secrets. Scientists admit that they still do not know what happens chemically when you wash your hands with soap.

Dr. McBain believes that when the physical structure of soap is understood, it will be easier to grasp the slippery chemical problem of what causes soap to dissolve dirt.

Science News Letter, January 11, 1941

IN SCIEN

MEDICINE

Diagnose Pancreas Tumors By X-Rays of Stomach

TUMORS of the pancreas can be diagnosed by X-rays, not of the pancreas, but of the neighboring stomach and duodenum, Dr. Samuel J. Brown, Dr. J. E. McCarthy and Dr. Archie Fine, of Cincinnati, announced at the meeting of the Radiological Society of North America in Cleveland.

Histories of 12 cases in which the diagnosis made in this way helped to successful treatment were reported.

The way in which the stomach, or the portion of the small intestine called the duodenum, are pushed out of place or out of shape, as shown by the X-rays, gives the clue to diagnosis of tumor of the pancreas, it was explained. The change in shape or location is caused by pressure from the tumor. Because the stomach and duodenum occupy a definite place in the abdominal cavity and are movable organs, their position, shape and distribution depends on the position, shape and size of neighboring organs. Changes occurring in the stomach and duodenum show certain characteristics, depending on the organ involved.

Science News Letter, January 11, 1941

PLANT PHYSIOLOGY

Birth Control for Apples May Come From Experiment

BIRTH CONTROL for apples, to break up the inconvenient habit certain trees have of producing huge crops one year and practically none the next, is a possible outcome of experiments reported by J. R. Magness and L. P. Batjer of the U. S. Department of Agriculture. They succeeded in breaking the rhythm of bearing in some of these "two-year" apple trees simply by spraying the buds, just as they began to show pink, with caustic chemicals that killed the flowers. The following season, when ordinarily the trees would have borne little or no fruit, they produced plenty of apples. The happy mean, a method whereby only part of the superfluous buds can be killed and equal crops produced every year, is still being sought.

Science News Letter, January 11, 1941

NE FIELDS

LANGUAGE

Scouts Save Sign Language If Indians Want It Again

IF AMERICAN Indians of the future want to learn their own sign language, they may have to call in Boy Scout teachers, for youngsters are now the main students keeping alive this communication system.

Deploring oblivion into which Indian talk-without-talk has sunken—except in Boy Scout circles—Robert Hofsinde, writing in *Natural History*, urges reviving signs as a simple universal language for world use.

Sign language, he says, is spoken fluently in the Indian world only by a few aged Indians, now. Once, on the Plains, 15 or 20 tribes speaking different languages conversed by signs, demonstrating the practical usefulness of universal sign talk.

Using only 169 gestures, Mr. Hofsinde can tell a story that calls for about 1,000 words in English.

Science News Letter, January 11, 1941

ARCHAEOLOGY

Mummy of Wah Unwound But Put Together Again

HOW to take the mummy of a 4,000-year-old Egyptian business man apart, and keep the whole mummy, too, is a Humpty-Dumpty puzzle, but the Metropolitan Museum of Art has found a clever solution.

To satisfy scientific curiosity, the Museum's Egyptologists have finally unwound this mummy of a man named Wah, to examine jewelry which X-rays tantalizingly revealed in the swathed interior. The jewelry becomes a new exhibit of considerable public interest in the Museum, showing patterns of silver and gold bead necklaces, and others made of amethyst, moss agate, porphyry and other stones, worn by well-dressed Egyptians about 2000 B. C.

Making a faithful replica of Wah's mask and shawl and other windings—but minus the jewelry inside—the Museum has found its way to retain for exhibit the appearance of Wah as the modern world first met him.

"Only another X-ray could prove that it is not the original," says Dr. Herbert E. Winlock, director emeritus and noted Egyptologist of the Museum, praising accuracy of the result, which of course is now labeled as a replica.

Wah, who was an estate manager in Thebes, is shown by his gilded face mask as a man of rather pinched face, with tiny mustache and scant whiskers at the jowls. Egyptian funerary workers added to this portrait a conventionalized wig of light blue and dark green stripes and a crudely painted collar of red, blue and green beads, which Dr. Winlock calls "a barbarous-looking affair," done by the local labor in Thebes. Thebes later became an important city, but in Wah's day it was just a countrified town.

The workers were careless, too. Egyptologists found a mouse, lizard, and cricket all trapped in sticky pitch that held the linen windings in place.

Science News Letter, January 11, 1941

OCEANOGRAPHY

Flash Photos Taken Of Bottom of the Ocean

NO PLACE in the world, not even the bottom of the ocean, is safe from the prying eye of the candid camera and its accompanying flash bulb. A new kind of deep-sea photography, of use in fisheries management, was described before the meeting of the Limnological Society of America by Prof. George L. Clarke of Harvard University and the Woods Hole Oceanographic Institute. Prof. Clarke told of the biological application of apparatus invented by Dr. W. Maurice Ewing of Lehigh University for purposes of geographical research.

Dr. Ewing's deep-sea flash-bulb camera can be lowered to a position near the bottom, where it gets a snapshot of an area about 2 1/2 by 3 1/2 feet in size. It has worked successfully in waters from about 125 feet to more than half a mile deep.

Photographs taken in the waters of Georges Bank, famous fishing ground northeast of New England, show a dense bottom population of animals, said Prof. Clarke. There are crabs, a sea-snail, starfish, sea-urchins, sand-dollars, deep-sea scallops and other shellfish, tube-building worms, and sponges. In two of the photographs the sand-dollars are so numerous that they are actually piled on top of each other. Singularly enough, however, no sign of plant life could be found on any of the photographs.

Science News Letter, January 11, 1941

BIOLOGY

"Jelling" of Protoplasm Goes With Anesthesia

WHEN you can't smell the ether any more, and the voices of the doctors and nurses have faded into silence, and you sink comfortably into the dark and stillness—that means that the protoplasm in whatever of your cells are essential to consciousness has "set" and become jellylike rather than fluid.

A theory that anesthesia consists in the "jelling" of protoplasm was offered before a symposium on protoplasmic streaming by Prof. William Seifriz of the University of Pennsylvania. The symposium was held as part of the meeting of the American Association for the Advancement of Science.

Prof. Seifriz has devoted a quarter-century of research to the properties of protoplasm, principally as evinced in the lowly organisms known as slime-molds, whose bodies consist merely of blobs of naked protoplasm. Treating these primitive forms of life with various anesthetics, he found that the streaming movement that goes on almost incessantly in its protoplasm stopped for some of the drugs, but apparently was immune to the effects of others. In every case where the streaming stopped, Prof. Seifriz found, the protoplasm had set into a jelly-like consistency, instead of the viscous fluid which is its usual state.

"The gelatinization of protoplasm reduces all physiological activities, including irritability, to a minimum, and this is anesthesia," he concluded.

Science News Letter, January 11, 1941

ENGINEERING

New Exposure Meter Measures Light on Subject

ANY amateur photographer who has ever been bothered about making the correct exposure will be interested in a new light meter described to the Society of Motion Picture Engineers by Captain Don Norwood, retired U. S. Army officer. Negative exposure control can now be put on the basis of an exact science, he declared.

The meter measures the direct light, at the source, rather than that reflected from the subject, and its calibrations show how to set the lens. He stated that reflectance problems occasioned by different tones, colors and shades are compensated for, while effects of contrast, haze, color, etc. which are factors ordinarily inviting errors, are eliminated.

Science News Letter, January 11, 1941

NUTRITION

A Bread Revolution

America's "Staff of Life" Will Provide New Strength When It Is Made To Contain the Morale Vitamin

By JANE STAFFORD

WE ARE on the eve of a food revolution. It will strike the average American home at the breakfast table some morning soon.

Our staff of life, bread, will be restored to an ancient estate, making it more worthy of bearing this proud title. Vitamins are coming to its rescue. For the better—breakfast toast, muffins, wheatcakes, the sandwich lunch, the dinner roll, will all be changed. They will be made of a new kind of flour. This flour is as rich in vitamins as that which gave primitive man strength for defense against his multitudinous enemies.

The new vitaminized flour will give modern Americans strength for defense in war. It will add strength to cope with the problems of modern civilized life which threaten as ominously as war itself.

Preparations for national defense have quickened the arrival of this food revolution, but it has been on its way for two or three years. The last steps are being taken now in the nation's capital in the Department of Agriculture offices of the U. S. Food and Drug Administration where a new definition of flour is being made.

Flour, wheat flour or white flour, legally in the United States today is "the fine ground product obtained in the commercial milling of wheat consisting essentially of the starch and gluten of the endosperm. It contains not more than 15% of moisture, not less than 1% of nitrogen, nor more than 1% of ash, and not less than 0.5% of fiber."

Tomorrow, this may still be the legal definition for white flour in the United States. It will not, however, be the legal definition for all wheat flour. Legally, there will be a new wheat flour, with a new name.

The new flour will not be a compulsory diet item for American citizens. Millers will still be able to make the old white flour. Bakers and housewives will still be able to make bread, rolls, cakes and pastry from the old white flour. All of us can go on eating the old white flour bread if we wish.

Any flour sold under the name chosen for the new flour, however, must meet the standards now being written into the definition. When the Food and Drug Administration announces the standards and definition and name for the new flour and sets the date for adoption of the definition, the new flour will become legal. The definition becomes part of the law of the land to which any flour sold under that new name, not yet selected, must conform.

When the new flour becomes legal, we shall all be urged, though not conpelled, to eat it, at least for the main part of the breadstuffs in our diet. And as more and more of us learn how much better the new flour is, the revolution will really get under way.

This revolution is something new in history, perhaps in the entire experience of mankind. Communities have put iodine into their table salt or into their drinking water; they have completely changed their water supplies for health. Probably never before, however, has an entire nation revolutionized a staple food for health reasons. England has just done it as a war measure. The threat of war, defense preparations, have hastened the flour revolution in the United States. But this is still no compulsory war measure, it is primarily a health measure.

The bread revolution we are about to experience will rescue 45,000,000 Americans from a state of chronic famine.

These people are not starving for lack of bread. Marie Antoinette's famous remark on the eve of another revolution, "Let them eat cake," does not apply in the present situation.

The kind of famine that is abroad in the land of plenty today was never dreamed of in the time of Marie Antoinette and the French Revolution nor until much, much more recently. The present famine is due to lack of vitamins and minerals, not to lack of food.

Victims of this vitamin famine are not hungry. On the contrary, they have no appetite and do not want food. They are tired, weak, nervous, easily frightened, worried. Many of them do not feel like working and they appear to be lazy and "ornery."

Vitamin starvation makes people sick, not hungry. People starved for vitamin C, the vitamin found in citrus fruits, tomatoes and cabbages, for example, get the sickness known as scurvy. Oriental people living on a diet consisting almost entirely of polished rice got a strange disease called beriberi. They were starved for a vitamin found in the outer, branny coat of the rice kernel. This vitamin was originally labeled vitamin B, the anti-beriberi vitamin.

Calling it the anti-beriberi vitamin was misleading. Doctors rarely see a patient sick with beriberi in the United States, although millions of Americans are starved for this anti-beriberi vitamin. The sickness they have takes a different form. First comes loss of appetite, then indigestion and constipation, weakness, fatigue,

HOME FLOUR MILL

The electrically driven home flour mill, in which the housewife can grind her own vitamin-rich whole wheat flour as she needs it, attracted the attention of M. L. Wilson, Department of Agriculture Director of Extension Work, as one solution to the bread problem. The mill shown was made by the C. S. Bell Co., and placed in a cabinet made at the School of Living, Suffern, N. Y.

VITAMIN FOR BREAD

The white, powdery-looking substance in the glass dish is riboflavin, one of the B vitamins slated probably to go into the new flour along with thiamin, nicotinic acid and certain minerals.

skin troubles, nervous and mental upsets. It is only recently that doctors have recognized these ailments and symptoms as being signs of vitamin B starvation.

This vitamin starvation comes not from living on polished rice because Americans do not eat so much rice, but from living on very refined flour. Wheat, from which most of our flour and bread is made, contains the anti-beriberi vitamin, known chemically as thiamin. It also contains other vitamins, known collectively as the vitamin B complex, and certain minerals. When wheat is ground in modern mills to make fine, long-keeping, pure white flour, 80% to 90% of the thiamin, and in addition a good portion of the other B vitamins and of the minerals, are removed with the bran, as they are when rice is polished to shiny whiteness.

Bread and white flour, because they are low-priced and bulky, filling foods, form a large part of our national diet. One authority says we eat 11 billion loaves of bread a year. The U. S. Bureau of Home Economics states that each American consumes flour and other cereals at the rate of 200 pounds per person per year. This single food item supplies us with one-fourth or more of our total food calories. In the case of 45,000,000 Americans who must count pennies even for food, bread or flour foods supply much more than one-fourth of the total food calories.

For years, nutritionists have been urging Americans to eat whole wheat bread, so they would be sure to get the B vitamins and the minerals of wheat. In spite of these educational efforts, however, we do not eat whole wheat bread to any extent. Only about 2% of all bread sold in the United States is the whole wheat variety.

So the 45,000,000 who depend heavily on bread for filling their stomachs and giving them energy and strength are starved for the B vitamins and certain minerals.

That is why bread, the staff of life, is going to have vitamins and minerals added to it. This is the bread revolution which will save millions from vitamin famine and bring extra strength and health to many millions more.

Revolutionizing bread has an ominous sound. Many people, remembering the dark, soggy breads of World War days in 1917-1918, may fear that the new bread, made from flour restored to its primitive nutritional state, will be unpalatable. Others, aware of the benefits to be had from the new bread, may be fearing that such benefits cannot be added without a considerable increase in the price of bread.

Such fears can safely be banished.

The label on the package of bread or flour you bring home from the grocery store may be the only thing that tells you the bread or flour you are about to eat has been revolutionized. Bread and flour are going back to their ancient estate but they will not be the coarse, dark, heavy stuff our ancestors ate.

Instead of being white as the virgin snow, the new bread and flour may be slightly creamy in color. This does not mean any loss in purity or in quality. It means, actually an improvement in quality, due to the presence in the flour or bread of vitamins and minerals which our present snowy white bread and flour lack—to the detriment of our health. If the vitamins are added in the form of synthetic chemicals, they may not cause any change in color of the bread at all. If they are added by using a part of the wheat kernel, as some millers are already doing, they will tinge the white flour with a faint cream color.

Flavor, if it is changed at all, will probably be improved. Reports on the new enriched flours already being produced by some mills state that the flour and bread from it acquires a pleasant, slightly nutty flavor. This will be good news to the epicures who for years have been complaining about the tastelessness of ordinary white bread and yearning for the kind that grandmother used to bake.

The most important quality of the new bread, of course, is something you cannot taste or see, but which in time you will feel. This is the improvement in health and strength which will come from the vitamins and minerals the new bread and flour will contain. People who eat this bread will feel stronger and more like working. They will feel brighter and more alert. Their appetites will improve. Their digestion will be better. They won't be so nervous and timid and apprehensive.

These benefits will, of course, take a little time to be felt. The first slice of the new bread is not going to make a new man or woman of you. People who will feel the benefits most will be those who need them most. These are the people whose food budget is so small that they must eat lots of bread, which is one of the cheap foods, in order to get filled up.

The bread revolution, finally, will be easy on the pocketbook. It would do no good to put vitamins and minerals in flour if they made the flour taste or look disagreeable, because people would not use it. It would not help the ones who most need these vitamins and minerals in bread if it made bread expensive. The cost of the new bread will depend somewhat on the method used to put vitamins and minerals into it. Present estimates are that the job can be satisfactorily done at an additional cost of about 75 cents a barrel of flour, although some authorities claim this would only cover the cost of the extra ingredients, not the cost of putting them into flour. Another estimate is that the new bread can be made to sell for about one cent more per loaf of bread. This will be in the beginning. Later, as the price of vitamin chemicals continues to drop and methods for adding them to flour improve, the cost may decrease.

National defense is the spark that has set off the bread revolution. In the midst of plans to build more airplanes and ships and guns, Americans have realized that the man-power of the nation must also be built up to top fighting strength. Scientists who for years have warned of the chronic famine, the vitamin starvation that afflicts millions of Americans, have stated that the kinds of food which will remedy the famine will also build strength and morale for defense.

One of the newest pieces of knowledge about vitamins is the evidence that thiamin, the old vitamin B_1, should change its alias from "anti-beriberi vitamin" to "morale vitamin." This is one of the

vitamins that will be put into the new bread and flour.

The evidence that gives thiamin a right to the new name of morale vitamin came from diet experiments at the Mayo Clinic. A group of healthy young people there were put on a diet otherwise adequate, but lacking in thiamin. These healthy persons developed, among other symptoms, moodiness, sluggishness, fear, and mental and physical fatigue.

"The states of mind and body observed in these subjects," comments the editor of the *Journal of the American Medical Association*, "were such as would be least desirable in a population facing invasion, when maintenance of stamina, determination and hope may mean defeat or successful resistance."

Equally striking were the results of another experiment in which increasing the daily ration of thiamin above the accepted adequate amount increased mental alertness and almost doubled the capacity for physical work. This shows that putting the vitamin into flour for toast, sandwiches and dinner rolls will not only protect millions from vitamin famine but give extra strength to those already getting adequate amounts of the vitamin from other foods.

Thiamin, the morale vitamin, and others of the vitamin B group are found in such foods as liver, lean meat, certain vegetables and yeast. Yeast has been suggested as one way of adding the vitamin to bread. The plan is to increase the amount of the vitamin in yeast by growing it on a special medium and using this yeast to make a vitamin-rich bread.

Many other plans for adding the B vitamins to flour or bread have been suggested and some already are being used. One flour milling company claims it is doing this by a method which retains the germ of the wheat kernel in the flour, thus retaining a good portion of the vitamin which is discarded by ordinary milling processes.

Thiamin is obtained from a selected portion of the wheat germ obtained in the milling process and put back into the flour by another milling concern. This company also adds another of the B vitamins and the minerals, iron and calcium, to its flour. This flour has won the approval of the American Medical Association's council on foods.

These flours and breads and others that have appeared within the last year, are the millers' and bakers' answer to the scientific and lay public demand for flour that is as nourishing as that which our ancestors found a veritable staff of life.

The number of these breads and flours, however, gives the housewife a confusing problem. Which is best? In her dilemma, she is turning to scientists and government bureaus for advice. Food and Drug administrators are also faced with a problem. Their job is to protect the public from adulterated foods.

The new flours and breads may be more nourishing than the old ones, but the flours, though not exactly adulterated, are not legally wheat or white flour. The Food and Drug Administration believes it can best serve and protect the public by creating a new definition for white flour-with-vitamins-and-minerals to which all millers can adhere.

The National Defense Advisory Commission, eager to build up the nation's man-power as well as its munitions, wants the people to have the benefit of flour restored to its ancient estate of vitamin and mineral richness. It cannot urge the use of enriched or fortified flours unless these contain enough of the right vitamins and minerals to bring real benefit. The National Defense Advisory Commission has turned to the scientists, requesting through Miss Harriet Elliot, Consumer Commissioner, formation of a committee of specialists to help determine how flour shall be modified to be a source of mental and physical stamina.

Such a committee has been organized. This committee, the Food and Drug Administration and the millers are now drawing the blueprints for the new flour.

Science News Letter, January 11, 1941

ESSAYS ON THE NEW VORTEX ATOM

by Carl F. Krafft

A new system of atomic structure in which the atom has a structural center, but no nucleus. The structural unit which is common to all atoms is the circular vortex ring in a quasifrictional dynamic ether of the kind used by Clerk Maxwell in his electromagnetic theory. By virtue of the electromagnetic properties of this ether, these vortex rings arrange themselves in such positions that adjacent portions do not rub across each other as in the Kelvin vortex atom, but have *only rolling contact*. The interiors of the atoms consist entirely of helium groups (alpha particles), but the external portions may consist partly or wholly of hydrogen groups (valence bonds). The new vortex atoms look somewhat like organic molecules, except that they are composed of helium groups instead of carbon atoms, and are radial structures with a high degree of symmetry. Every physics and chemistry teacher should have a copy.

Free upon request

C. F. Krafft, 2510 Q St. N. W., Wash., D. C.

BASEMENT COMPLEX

Dr. Harlan T. Stetson, of the American Geophysical Union, exhibited this model prepared by Dr. W. P. Thom of the basement complex of underlying continental United States made from the latest geophysical surveys. The exhibit was displayed at the meeting of American Association for the Advancement of Science in Philadelphia.

GENERAL SCIENCE

Science Has Not Failed Man; Man Failed To Use Science

Prof. Carlson Charges We Are Devoted to Gadgetry; Make No More Use of Scientific Method Than Peking Man

SCIENCE has not failed humanity; it is humanity that has failed to make use of the scientific method for its own benefit, declared Prof. A. J. Carlson of the University of Chicago, in the Sigma Xi lecture, delivered in connection with the meetings of the American Association for the Advancement of Science. The annual lecture of the Society of the Sigma Xi, honorary scientific fraternity, is an outstanding feature of these midwinter meetings.

People who talk glibly about this being the Age of Science, Prof. Carlson said, are very apt to be thinking only of the applications of science in technology and invention and the ready popular acceptance of these benefits, not of the essence of science itself; the painstaking acquisition of masses of accurately known facts, the critical and objective interpretation of these facts, and the direct application of principles thus discovered to the problems of everyday life. We are devoted to gadgetry, not to science, the speaker maintained; the great mass of humanity, still traditionalist, makes no more use of the scientific way of thinking than did Peking Man a million years ago.

There are three outstanding causes for the failure of modern science measurably to influence human drives and conduct, according to Prof. Carlson's analysis:

1) Prevailing education, from infancy in the home on through college, is largely education by dictation — indoctrination rather than education by understanding the why and wherefore through experimentation. "You can teach a parrot to talk Latin," said Prof. Carlson, "but the Latin-speaking bird would still be a parrot."

2) Many scientists all too readily abandon the scientific method of thinking as soon as they are outside their own specialty, becoming as emotional and prejudiced as any non-scientific person. They get caught at this inconsistency by the man in the street, who thereupon weakens in his faith in science.

3) Man has a tremendous resistance to new ways of thinking and new ways of life. He resists science, which is after all a comparatively recent thing, as stubbornly as he resists religion, which has been pushing at him for thousands of years using sanctions of promised reward and threatened punishment that are not in the armamentarium of science at all.

Yet despite all these discouragements, Prof. Carlson refuses to be dismayed. He concluded:

"I think we can say, that during the ups and downs of a million years man has gradually acquired more understanding, more freedom from fear and hate, more dignity, greater kindness, and a clearer conception of justice.

"Even though for the moment, 'the bird of sorrow' is not only flying over our heads, but is actually nesting in our hair—to borrow a Chinese proverb—that bird will not nest in our hair forever, unless the torchbearers blow out the light.

"For, slowly but surely, the method of science will help to make life more intelligent, toil more cheerful, fear and hatred, pain and tears less abundant for mankind. If in any place or time the blind fury of hatred and the insane violence of war render the pursuit of science impossible, and the scientific method submerged and forgotten, it will be rediscovered, in better days, by better men."

Science News Letter, January 11, 1941

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IN

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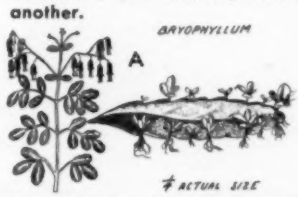

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Urges Bases in Greenland For Planes and Submarines

Location Favored to Forestall Similar Attempt By Hostile Powers and To Guard Great Circle Ship Lanes

THE UNITED STATES should establish plane and submarine bases in Greenland, Prof. William H. Hobbs of the University of Michigan told the American Association for the Advancement of Science. This should be done, he said, partly to forestall any attempt on the part of possibly hostile powers to establish such bases for use against this continent, partly because possession of such bases on our part would enable us to dominate the main great circle route for ships operating between the United States and the ports of northern Europe. This route lies only 100 miles from the extreme southern tip of Greenland.

Favorable locations for landing fields are few, Prof. Hobbs admitted. However, there are at least three promising sites, one on the east coast and the other two on the southwest coast. In addition, he pointed out, it would be possible to use flying boats based on the fjords, whence submarines would also operate. It is possible to make plane landings on the inland ice well back from the coast, but difficulties of transporting supplies over the rough intermediate zone would probably make the servicing of planes at a base on the ice cap too difficult.

"A submarine base could be established in one of the fjords of extreme South Greenland," Prof. Hobbs stated. "Whether it could operate during the winter when the coast is flanked by pack ice is a question not yet given a demonstration, though it is highly probable."

As is well known, the sea area around Greenland is one of the foggiest places in the world. Not so well known, according to Prof. Hobbs, is the fact that the fogs do not come over the land to any great extent. This situation would give the planes a great advantage, as also would the prevailing winds. The air circulation over and around Greenland provides dependable winds blowing away from the land at one level and back toward the land at a higher level. This would enable planes to fly with a good tail-wind both going and coming.

Sufficient legal sanction for American occupation of such posts in Greenland can be found in the Havana pact, which has now been ratified by the required 21 Western Hemisphere powers.

Science News Letter, January 11, 1941

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Attack Likely Via Dakar

DAKAR, Vichy-held port on the West African coast, was indicated as the likeliest danger focus in a totalitarian attack on America's jugular vein at Panama, by Capt. G. S. Bryan, hydrographer of the U. S. Navy, in an address on geography and the defense of the Caribbean and the Panama Canal.

Even the combined fleets of Europe, convoying a vast fleet of transports loaded with invader troops, would hardly risk a straight-out attack on the Caribbean bases with no base of their own nearer than Europe, Capt. Bryan declared. The position of the defenders would be too strong, especially for plane and submarine action, and any damaged ships of the enemy would have nowhere to go for repairs.

Far more likely, he continued, would be an expedition based on Dakar, moving across the narrow part of the South Atlantic to seize a base on this side on the Brazilian coast, then working northward. The combat fleet could come alone, leaving the convoy behind until they had blasted a way through the American defenses, aided by land planes from the new base. Damaged ships could then retire to safety at more practicable distances.

There is far less danger of attack on the Panama Canal from the Pacific side, Capt. Bryan held. The shortest distance from Yokohama to Panama, he said, lies along a great circle route that skirts the Aleutian islands and the whole Pacific coast of North America—obviously a strategic lunacy to follow. The most practicable route would be by way of Hawaii—which would first have to be taken.

In any case, the Canal itself would not be worth much to an Asiatic power. More tempting would be the actual exploitable resources of Mexico, Central America and the west coast of South America. The military importance of the Canal, to an outsider, is negative—it would be desirable to cripple it for American use by a gigantic raid, but seizure and permanent occupation hardly promise rewards enough to make the effort worth while.

Capt. Bryan pointed out the curious situation, that the most complete screen of islands affording bases for light and heavy naval forces and land planes is on the Atlantic side, where overseas attack would be easiest, whereas nearby island groups are fewer and less advantageously placed on the Pacific side, where attack would be hampered by long distances and presence of strong defense bases on the flanks of possible lines of travel.

Science News Letter, January 11, 1941

INVENTION

Stop Light for Bicycles Works When Pedals Reverse

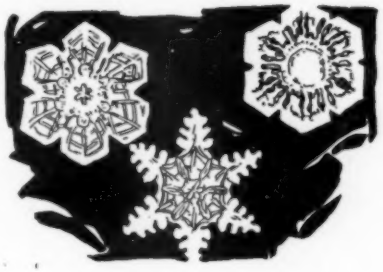
A STOP light for bicycles, which operates when the direction of the pedals is reversed to apply the brakes, is the subject of a recent patent. (*U. S. Patent 2,222,075, Hiram R. Johnston, Hamilton, Ohio.*)

Science News Letter, January 11, 1941

METEOROLOGY

NATURE RAMBLINGS

by Frank Thone



Falling Frozen Water

UNFROZEN water falling from the clouds always comes down in the form of drops. These may be large or small, but they are always simple round drops, whether in rain, drizzle or fog.

Falling frozen water, however, presents an entirely different picture. It can come down in at least four distinctive forms, each with its own underlying set of physical causes.

Most familiar, of course, is snow. Snow is frozen as it forms and stays frozen all the way down. A snowflake begins like a raindrop, with the condensation of atmospheric water vapor on some tiny solid nucleus, like a microscopic dust grain or salt crystal. But the precipitated water is solid and crystalline itself, and it continues to accumulate crystalline additions, always in a symmetrical six-sided pattern. No two snow crystals have ever been seen that were exactly alike.

Next to snow, hail is probably the most familiar kind of frozen precipitation. Although hailstones are by far the biggest particles of frozen water (indeed, sometimes they are downright chunks!) hail practically never falls in winter. That is because the peculiar rolling turbulence in the atmosphere necessary for hailstone formation depends on rising currents of heated air, which of course are not likely to happen in winter. Hailstones are recognizable by their onion-layered structure, caused by the freezing of fresh additions of water to their outside surfaces every time they are tossed upward through a stratum of cold air.

Small pellets of clear ice that sometimes fall in winter are sometimes miscalled hail, but are really sleet. They are simply raindrops formed in a warm air stratum aloft, frozen as they fall through cold air on the way to earth.

Another kind of frozen pellet, white and "sugary" in appearance instead of clear, is believed to consist of snowflakes. partially thawed in a layer of warm air, then re-frozen in a lower cold layer. There is no common English name for this, but the German name, graupel, is (*mirabile dictu!*) short, convenient and easy to pronounce, so American weather men have generally adopted it.

The sheathing ice that sometimes forms on the ground and all surface objects is often called sleet, but its proper name is glaze. It is the result of nearly-frozen rain falling on surfaces which are below freezing temperature.

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ASTRONOMY

Newly Found Force Is 200 Times That of Gravity

A NEWLY discovered force, 200 times as effective as gravity, was announced to the American Astronomical Society, meeting at the Franklin Institute, Philadelphia.

Dr. Lyman Spitzer, Jr., of Yale University Observatory, told of this attraction, which acts on minute particles of dust between the stars. It is really a consequence of a well-known effect—the same pressure of light that makes a comet tail point away from the sun.

Such radiation pressure pushes on the dust particles in space. When two different pieces are in line with the body from which light is coming, the first one absorbs light that would go to the other, and hence tends to approach the second. The force of this attraction is 200 times as great as their gravitational pull on each other, he stated.

With only two particles, this force would not be appreciable, but there is a great deal of material between the stars, and the attraction has to be considered in studying the behavior and distribution of interstellar matter, it was declared.

Each particle, he said, has a negative electrical charge of about two volts potential. Since they are charged the same way, there is a repulsion between them and thus they will never come together. Their average speed, he explained, is about two or three miles per hour.

Science News Letter, January 11, 1941

Apple raspberry juice is a new fruit *beverage* introduced by a New York State Experiment Station.

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COLCHISALVE — Colchicine in the ready, easy to use form. Simply paint on buds. You can experiment in your garden with this "evolution drug" which creates new unheard of varieties of plants . . . warning—"poison". In ½ oz. Jar . . . $2.00.

SOILLESS SALTS—Make a chemical garden or give your plants new vigor . . . Each tablet contains all elements necessary plus vitamins B_1 and B_2 . . . 50 tablets $1.00 (50 quarts solution).

MT-Scope—locates buried metals by radio waves. Circular 25c.

BRYOPHYLLUM LEAF—Tropical sprouting leaf, free with each order.

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•First Glances at New Books

CHEMISTRY

MODERN CHEMISTRY (Rev. ed.)—Charles E. Dull—*Holt,* 777 p., illus., $1.80. This edition brings up to date a high school text published first in 1936. A section is devoted to atom-smashing which, the author says, is "the favorite indoor sport among university professors of physics and chemistry."

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BIOLOGY

LIVING THINGS AND YOU, A Biology Textbook—Elliot R. Downing and Veva M. McAtee—*Lyons and Carnahan,* 673 p., illus., $1.80. Biology for high school students, simply and forcefully presented. Illustrations are well-chosen, new, and cleanly drawn.

Science News Letter, January 11, 1941

ZOOLOGY

PRACTICAL ZOOLOGY—H. R. Hewer—*Chemical Pub. Co.,* 118 p., $2. Laboratory directions for the dissection of a number of animal types commonly studied in general zoology courses.

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CHEMURGY

THE DOMESTIC PRODUCTION OF ESSENTIAL OILS FROM AROMATIC PLANTS—*National Farm Chemurgic Council,* 77 p., illus., 50c.

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CHEMISTRY

SEMI-MICRO QUALITATIVE ANALYSIS (2d ed.)—Carl J. Engelder, Tobias H. Dunkelberger and William J. Schiller—*Wiley,* 305 p., $2.75. The first edition of this book, in 1936, introduced the so-called "semi-micro" technique into many colleges. Experience with that has led to changes in this new edition which should make it still more useful.

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EVOLUTION

GENES AND GENESIS—Harold W. Clark—*Pacific Press Pub. Assn., Mountain View, Cal.,* 155 p., $1.50. Basing his thesis on recent admissions by biologists of difficulties in reconciling the principles of genetics with classic teachings in evolution, the author makes a plea for a return to creationism so far as principal groups are concerned, with a certain amount of developmentalism tolerated in species and perhaps genera. While the presentation is earnest and sincere, and is made with a minimum of heat, it is not likely to satisfy either the extreme literalist or the thorough-going evolutionist.

Science News Letter, January 11, 1941

CHEMISTRY

A LABORATORY GUIDE FOR ORGANIC CHEMISTRY (2d ed.)—E. Wertheim—*Blakiston,* 560 p., $2. This book offers a laboratory course which may include preparation work, test-tube reactions, and experiments in qualitative analysis in such proportions as the instructor chooses.

Science News Letter, January 11, 1941

CHEMISTRY

THE CHEMIST AT WORK—Roy I. Grady, John W. Chittum and others—*Journal of Chemical Education,* 422 p., illus., $3. This is the book that a teacher should recommend to a student who is thinking of chemistry as a career. Each of the many authors contributes the chapter relating to his or her branch of chemical research.

Science News Letter, January 11, 1941

CHEMISTRY

MANUAL OF INDUSTRIAL HEALTH HAZARDS—Joseph B. Ficklen—*Service to Industry,* 176 p., $4. More than ninety noxious gases, vapors and dusts which occur in industry are here described, together with such other data as the symptoms they produce and the methods of testing for their presence.

Science News Letter, January 11, 1941

PHYSICS

QUARTZ OSCILLATORS AND THEIR APPLICATIONS—P. Vigoureux—*British Library of Information,* 131 p., $1.35. Use of quartz crystals for radio frequency standards is but one of the applications treated in this work.

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ANTHROPOLOGY—BIBLIOGRAPHY

A BIBLIOGRAPHY OF THE NAVAHO INDIANS—Clyde Kluckhohn and Katherine Spencer—*Augustin,* 93 p., $1.50.

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GENETICS

PRINCIPLES OF GENETICS — E. Grace White—*Mosby,* 352 p., illus., $2.50. A new textbook, suitable for use in college classes, by the head of the biology department at Wilson College. The author has managed to shear off superfluities, yet to retain all essentials.

Science News Letter, January 11, 1941

ECONOMICS

GUIDEPOSTS FOR RURAL YOUTH—E. L. Kirkpatrick—*American Council on Education,* 167 p., $1. Programs prepared for the American Youth Commission suggesting practical steps for improving the situation of rural youth. Seven million rural children and youth, Director Reeves says in a foreword, are growing up under handicaps. Large numbers of them are living under conditions that are unwholesome for themselves and highly detrimental to the strength of the nation.

Science News Letter, January 11, 1941

ARCHAEOLOGY

ANCIENT SEALS OF THE NEAR EAST—Richard A. Martin—*Field Museum of Natural History,* illus., 25c. Features exceptionally clear photographs of ancient Mesopotamia's cylinder seals. Those portrayed are from world famous collections and are among finest examples known.

Science News Letter, January 11, 1941

GENERAL SCIENCE

REVIEW OF ACTIVITIES FOR THE YEAR ENDED MARCH, 1939—*National Research Council of Canada, Ottawa, Canada,* 175 p., 75c.

Science News Letter, January 11, 1941

CHEMISTRY

LIST OF HEADS OF DEPARTMENTS OF CHEMISTRY AND CHEMICAL ENGINEERING IN AMERICAN UNIVERSITIES AND COLLEGES—*Div. of Chemistry and Chemical Technology, Nat'l. Research Council,* 32 p., 25c.

Science News Letter, January 11, 1941

MATHEMATICS

MATHEMATICAL LOGIC — Willard Van Orman Quine—*Norton,* 348 p., $4. This includes the material presented by the author in his Harvard University course. Though it does not presuppose any previous training in mathematics or philosophy, it is intended for the serious reader and many sections require close study.

Science News Letter, January 11, 1941

ELECTRICAL ENGINEERING

PRINCIPLES OF ELECTRICAL ENGINEERING (3rd ed.)—William H. Timbie and Vannevar Bush—*Wiley,* 540 p., illus., $4.50. Ten years is a long period in an active branch of engineering, and that is the interval which has elapsed since the second edition of this standard work appeared. It is now brought completely up to date.

Science News Letter, January 11, 1941